Book Review

Image Processing - The Fundamentals by

Maria Petrou & Costas Petrou

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Although many books are available in the area of image processing this book image processing the fundamentals by Maria Petrou and Costas Petrou have explain this subject in a distinctive way. In this book author have attempted to capture new inside with lots of example in all the fundamental topics in image processing. All the chapter of the book are written in interaction form where many questions and answers are discussed to describe theoretical concept of each topic discussed. All examples are supported by simulated results which offer more clarity of results in readers mind. The book is accompanied by a CD with all the MATLAB programme for all chapters. The MATLAB programs are intended to support example explained in the book. The CD also contained collection of slide presentation in PDF format which is accompany with web page of the book. Book is introducing the mathematical foundations of image processing in th state of the art way. The basic topic like image enhancement, image restoration and feature extraction is discussed in detail with various examples for the theory support.

The material may help the instructor to teach this subject better way. In this book authors maid have made a great effort to explain all the nuts and bolts behind the image processing concepts which increase the readers interest while reading this book. This book definitely helps students to improve example solving skill for this course. The book contains seven chapters. First chapter provides introduction of image processing where all the basic terms resolution, restoration, point straight function properties of systems are explained with examples in the second chapter image transforms are explained where SVD ,Haar, Walsh , Hadamard transforms are explained. DFT is also explained with many concept of Odd and Even symmetry in detail with examples.

The chapter mainly focuses on statistical description of images which is mandatory background required to understand many image processing algorithm. In the previous chapter, how the basis of an elementary images are form that is discussed. In this chapter all the basic concept of probability and random variable is described in spatial domain. The transformation of an image into a basis of elementary image for expressing it in optical way a whole set of images are explained with different transformed like KL transform, independent component Analysis(ICA) .

The fourth chapter addresses details of image enhancement process. It is very basic and important pre-processing step. The elements of linear filter theory are explained in frequency domain with various examples. It also described types of noises and spatial and frequency domain filtering method. Contrast enhancement can be also achieved by histogram manipulation techniques which are also illustrated in detail.

The fifth chapter is focused on image restoration and all the basic method like inverse filtering, wiener filter and homogeneous and inhomogeneous linear image restoration techniques are described with required basic mathematical derivation and examples in a lucid manner so that student can understand it. Even nonlinear image restoration MAP estimation and geometric image restoration techniques also explained.

The sixth chapter is about the image segmentation and edge detection methods. In this chapter all the basic segmentation method like histogram based, split and merge morphological watershade method with their limitation and advantages. Edge detector place an important role in object recognition so most widely used sobel, canny, Laplacian ,Gaussian edge detector are explained with lot of details and derivations each. I must say that authors have taken lot of pain to clarify all the concept with examples. Even face congruency and monogenic, non maxima subtraction are one of the difficult topics to illustrate with derivation of example which are also described well in this chapter.

In the last multispectral image processing method and basic concept of image processing is addressed. The physic and psycho physics of color vision describe d with example which is no where i found in the literature with the great detail. All the color image system space and different color image processing methods used in practice to enhance the color image are illustrated with number of simulated results which are depicted at the end of the chapter. Overall book is written after lot of original and creative work done for several years in this area. The aim of the book is not covering the most recently proposed algorithm in conferences or latest journal issues. But emphasizes more on algorithms which are already established and earned their worth in recent years. All MATLAB programs and images given on the CD are worth to simulate ones which demonstrate many example described in book.